In most cases, roadway street lighting can be designed to illuminate the sidewalk area as well. The visibility needs of both pedestrian and motorist should be considered. In commercial or downtown areas and other areas of high pedestrian volumes, the addition of lower level, pedestrian-scale lighting to streetlights with emphasis on crossings and intersections may be employed to generate a desired ambiance. A variety of lighting choices include mercury vapor, incandescent, or less expensive high-pressure sodium lighting for pedestrian level lighting[1]. Roadway streetlights can range from 20-40 feet in height while pedestrian-scale lighting is typically 10-15 feet.

It is important to note that every effort should be made to address and prevent light pollution. Also known as photo pollution, light pollution is "excess or obtrusive light created by humans"[4]. Whenever urban improvements are made where lighting is addressed, a qualified lighting expert should be consulted early in the process. This individual should not only create a safe and attractive ambiance, but will do so with the minimum of fixtures, an awareness of the importance of minimizing photo pollution, and with a focus on minimizing future energy use. A thoughtful plan of how and where to light will reap benefits not only in potential reduced infrastructure cost, but future energy costs as well.

Guidelines[9]:

- Ensure pedestrian walkways and crossways are sufficiently lit.
- Consider adding pedestrian-level lighting in areas of higher pedestrian volumes, Downtown, and at key intersections.
- Install lighting on both sides of streets in commercial districts.
- Use uniform lighting levels.

Cost[1]:

Varies greatly depending on design, fixture selection, and public utility

Street Furniture and Walking Environment

As part of a comprehensive sidewalk and walkway design, all street furniture should be placed in a manner that allows for a safe, pleasurable, and accessible walking environment. Good-quality street furniture will show that the community values its public

spaces and is more cost-effective in the long run. Street furniture includes benches, trash bins, signposts, newspaper racks, water fountains, bike racks, restaurant seating, light posts, and other ornaments that are found within an urban street environment. Street furniture should mostly be considered in the Downtown area and other important pedestrian-active areas.

In addition to keeping areas free of obstruction from furniture, a walking environment should be clean and well maintained. Attention should be given to removing debris, trimming vegetation, allowing for proper stormwater drainage, providing proper lighting and sight angles, and repairing or replacing broken or damaged paving material can make an enormous difference in pedestrian perception of safety and aesthetics. Special attention should be paid to the needs of the visually impaired so that tripping hazards and low hanging obstructions are removed.

Figure 6(x):
The street furniture shown here is placed in such a manner so as to create a safe, pleasurable, and accessible walking environment[1].

Guidelines[3]:

- Ensure proper placement of furniture; do not block pedestrian walkway or curb ramps or create sightline problems.
- Wall mounted Objects = not to protrude more than 4" from a wall between 27" and 7' from the ground
- Single post mounted Objects = not to protrude more than 4" from each side of the post between 27" and 7' from the ground
- Multiple Post Mounted Objects = lowest edge should be no higher than 27" and no lower than 7'
- Place street furniture at the end of on-street parking spaces rather than in middle to avoid vehicle-exiting conflict.

Cost[1]:

Varies depending on design, furniture selection, material, and level of landscaping

Transit Stop Treatments

Currently the Town of Holly Springs is not served by any public transportation. In the event that such an opportunity is made available to the Town, it is appropriate to consider some of the basic elements of a well designed, accessible, and functional transit stop.

Bus or other transit stops should be located in places that are most

Figure 6(y):
This typical transit stop has all of the key features of shelter, ample seating, bicycle parking, landscaping, and trash bins[1].

suitable for the passengers. For example, stops should be provided near higher density residential areas, commercial or business areas, and schools, and connected to these areas by sidewalk. Some of the most important elements to consider are the most basic: sidewalk connectivity to the stops, proper lighting, legible and adequate transit stop signage, shelter, seating, trash bins, bicycle and even car parking. Transit stops create an area of activity and may generate additional business and pedestrian traffic. Therefore an opportunity is created to provide adequate sidewalks and other pedestrian oriented design elements. At a minimum, marked crosswalks (especially at mid-block stops), curb ramps, and proper sidewalk widths should be considered.

As with any human scale design element discussed, safety is an important factor to consider when locating bus stops. In the case of a bus stop, special attention should be paid to the number of lanes and direction of traffic when deciding to locate a stop on the near or far side of an intersection. Also special consideration must be paid to the wheelchair lifts in terms of how and where the mobility impaired will exit and enter the bus.

Cost[1]:

Can vary greatly from $1,000 to $10,000

Pedestrian Signs and Wayfinding

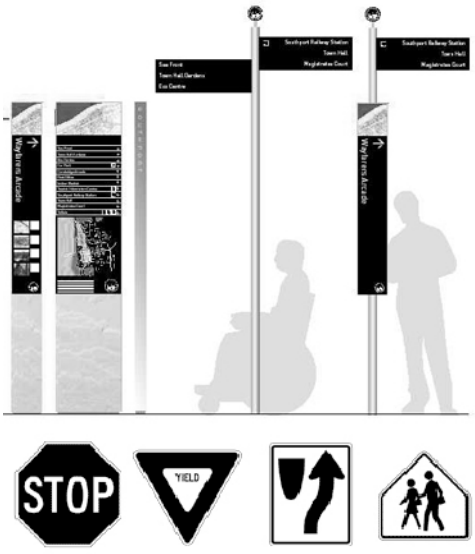


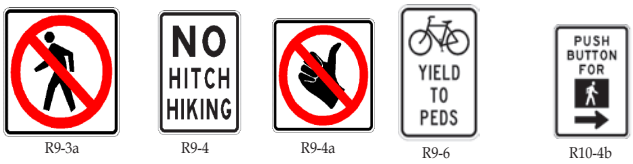
Figure 6(z):
Wayfinding signs promote aesthetics as well as provide important information[6]. Below are typical traffic signs found around pedestrian friendly places[1].

Signage provides important safety and wayfinding information to motorist and pedestrian residents and tourists. From a safety standpoint, motorists should be given advance warning of upcoming pedestrian crossings or of traffic calming areas. Signage of any type should be used and regulated judiciously. An inordinate amount of signs creates visual clutter. Under such a condition, important safety or wayfinding information may be ignored resulting in confusion and possible pedestrian vehicle conflict. Regulations should also address the orientation, height, size, and sometimes even style of signage to comply with a desired local aesthetic.

Wayfinding signage should orient and communicate in a clear, concise and functional manner. It should enhance pedestrian circulation and direct visitors and residents to important destinations. In doing so, the goal is to increase the comfort of

MUTCD Pedestrian-Related Signage

Regulatory Signs



School, Warning, and Informational Signs

Sign	MUTCD Code	MUTCD Section	Conventional Road	
Yield here to Peds	R1-5	2B.11	450x450 (18x18)	Regulatory
Yield here to Peds	R1-5a	2B.11	450x600 (18x24)	
In-Street Ped Crossing	R1-6, R1-6a	2B.12	300x900 (12x36)	
Peds and Bikes Prohibited	R5-10b	2B.36	750x450 (30x18)	
Peds Prohibited	R5-10c	2B.36	600x300 (24x12)	
Walk on Left Facing Traffic	R9-1	2B.43	450x600 (18x24)	
Cross only at Crosswalks	R9-2	2B.44	300x450 (12x18)	
No Ped Crossing	R9-3a	2B.44	450x450 (18x18)	
No Hitch Hiking	R9-4	2B.43	450x600 (18x24)	
No Hitch Hiking (symbol)	R9-4a	2B.43	450x450 (18x18)	
Bikes Yield to Peds	R9-6	9B.10	300x450 (12x18)	
Ped Traffic Symbol	R10-4b	2B.45	225x300 (9x12)	
School Advance Warning	S1-1	7B.08	900x900 (36x36)	School, Warning, informational
School Bus Stop Ahead	S3-1	7B.10	750x750 (30x30)	
Pedestrian Traffic	W11-2	2C.41	750x750 (30x30)	
Playground	W15-1	2C.42	750x750 (30x30)	
Hiking Trail	I-4	--	600x600 (24x24)	

1. Larger signs may be used when appropriate.
2. Dimensions are shown in millimeters followed by inches in parentheses and are shown as width x height.
3. First dimension in millimeters; dimensions in parentheses are in inches.
4. All information in table taken directly from MUTCD.

visitors and residents while helping to convey a local identity[5].

Maintenance of signage is as important as walkway maintenance. Clean, graffiti free, and relevant signage enhances guidance, recognition, and safety for pedestrians.

Cost[1]:

Signage: $50 - $150 plus installation

Bridges

Provisions should always be made to include a walking facility as a part of vehicular bridges, underpasses, or tunnels, especially if the facility is part of the Pedestrian Network. All new or replacement bridges, other than those for controlled access roadways, should accommodate pedestrians with wide sidewalks on both sides of the bridge. Even though bridge replacements do not occur regularly, it is important to consider these in longer-term pedestrian planning.

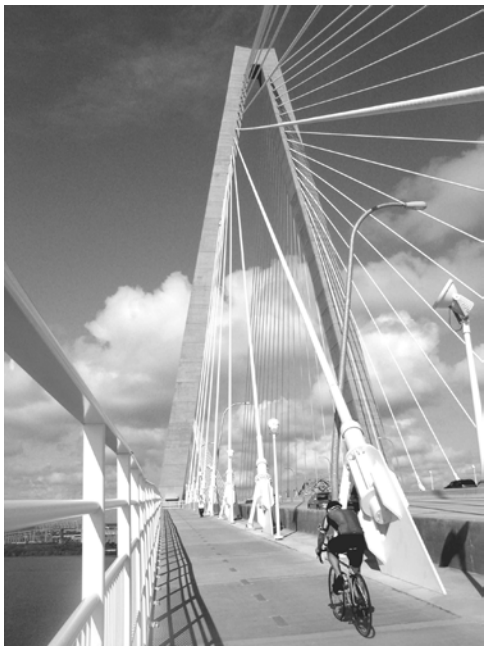


Figure 6(aa): Sidewalks or multi-use trails should be included as part of vehicular bridge designs.

It is NCDOT bridge policy that within Urban Area boundaries, sidewalks shall be included on new bridges with curb and gutter approach roadways with no controlled access. Sidewalks should not be included on controlled access facilities. A determination on whether to provide sidewalks on one or both sides of new bridges will be made during the planning process according to the NCDOT Pedestrian Policy Guidelines. When a sidewalk is justified, it should be a minimum of five to six feet wide with a minimum handrail height of 42".

It is also NCDOT bridge policy that bridges within the Federal-aid urban boundaries with rural-type roadway sections (shoulder approaches) may warrant special consideration. To allow for future placement of ADA acceptable sidewalks, sufficient bridge deck width should be considered on new bridges in order to accommodate the placement of sidewalks.

Additional Information:

http://www.ncdot.org/doh/construction/altern/value/manuals/RDM2001/part1/chapter6/pt1ch6.pdf

http://www.ncdot.org/doh/construction/altern/value/manuals/bpe2000.doc

Guidelines:

- Sidewalks should be included on roadway bridges with no

controlled access with curb and gutter approach in Urban Areas.

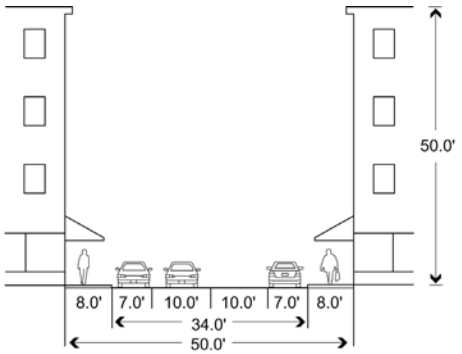
- Sufficient bridge deck width should be considered on new bridges with rural-type shoulder approaches for future placement of sidewalks.
- Sidewalk should be 5' to 6' wide.
- Minimum handrail height should be 42''

6.2 Typical Cross-Sections

Context, dimension, and scale are important considerations when developing new or retrofitting existing pedestrian friendly environments. Context refers generally to the place: is it urban, rural, residential, commercial, industrial or mixed? Dimension relates to the actual size and distance of objects such as buildings. Scale relates to how both context and dimension work together within a given locality. It is often a subjective observation based on the feeling generated while occupying a space. A place that is not scaled properly will most likely feel uncomfortable, while those that are will be more pleasurable. According to the American Planning Association, some important factors within a pedestrian environment are[8]:

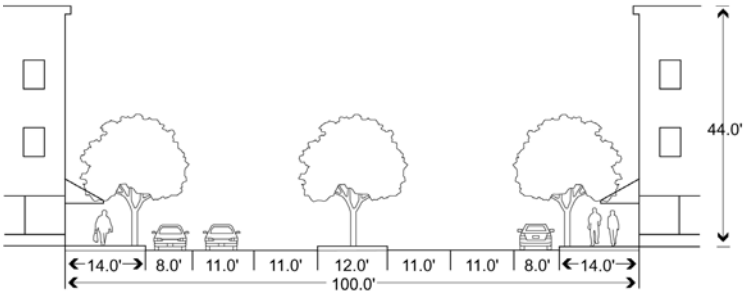
- parking configuration
- building use
- degree/type of non-motorist activity
- truck traffic percentage
- ADA requirements
- location within the urban fabric
- transit use

Figure 6 (bb):
With a building ratio of 1:1, where the building heights are the same as the distance between them, a sense of enclosure is established quite easily. Depending on traffic requirements, the space can be used for tree plantings, bike lanes, wider sidewalks, or a combination of those elements[8].



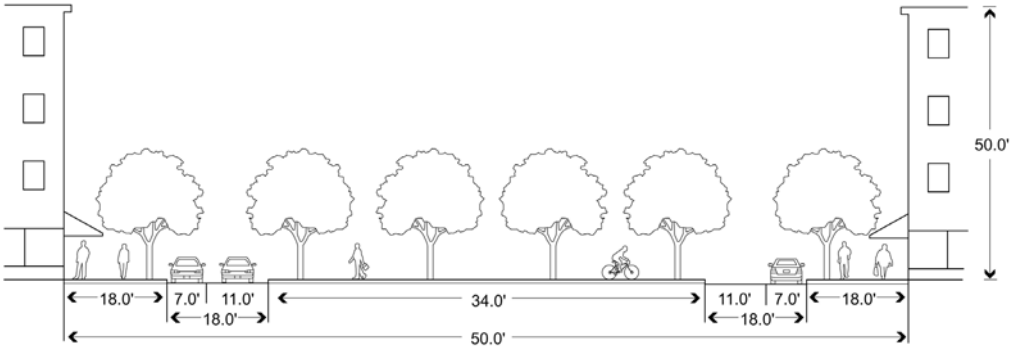
1:1 Ratio

Figure 6(cc):
A building ratio of 2:1 where the building heights are half of the distance between them, requires the addition of other elements to help maintain a sense of enclosure and to reinforce the notion of human scale, and pedestrian friendly environments[8].

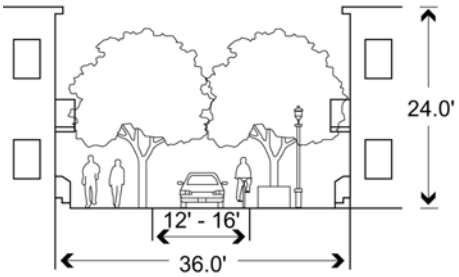


2:1 Ratio

Figure 6(dd):
A ratio of 3:1 approaches the maximum distance between buildings before the building edges cease to relate to each other. Any ratio larger than 4:1 starts to lose a perception of enclosure and should be avoided if at all possible[8].

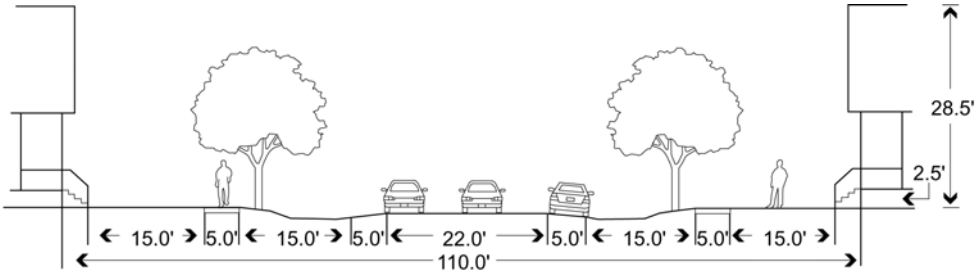


3:1 Ratio



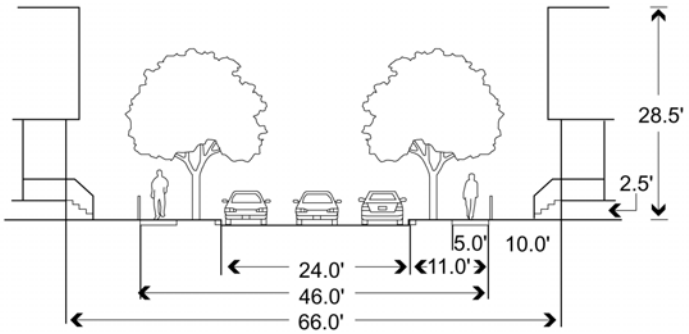
Woonerf

Figure 6(ee):
Woonerfs, otherwise know as, Home Zones, are planned communities where the pedestrian is given precedence over the automobile. The streets meander as does the paving material so that the motorist must travel slowly and cautiously. Building proportions are generally at a 1:1.5 max. Residential and mixed use buildings front the often tree lined streets. These neighborhood designs create interesting and innovative opportunities for interactions of public and private space [8].



Low ADT Yield Street

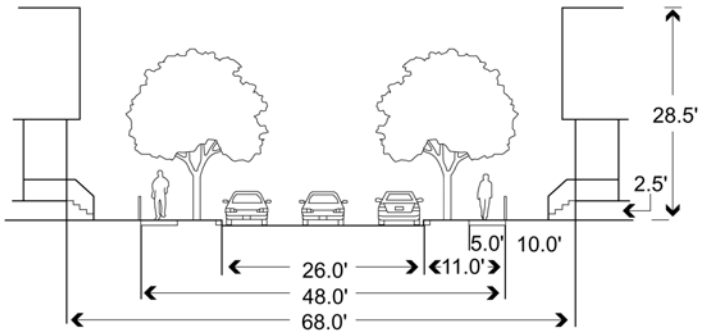
Figure 6(ff):
In a more rural area, the Low ADT Yield Street is appropriate given the often immense building ratio of between 4:1 and 5:1. These areas are often defined by low density residential use with open drainage



Edge Yield Street

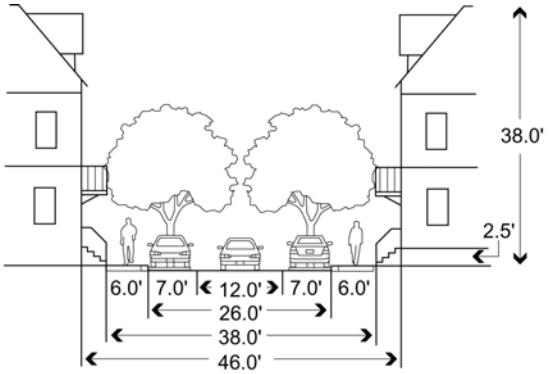
Figure 6(gg):
The Edge Yield Street is recommended for the center or edge of neighborhood. The blocks should be short and consist mostly of single family detached housing. The building separation ratio is at a 3:1 or 4:1 max[8].

Figure 6(hh):
The AASHTO Recommended Street is a highly desirable form of a residential neighborhood where the Woonerf is not appropriate. Parking needs must be addressed however alleys may serve as opportunities for vehicle and building access. These neighborhoods feature closed drainage, street trees (preferably native species), and offset sidewalks[8].



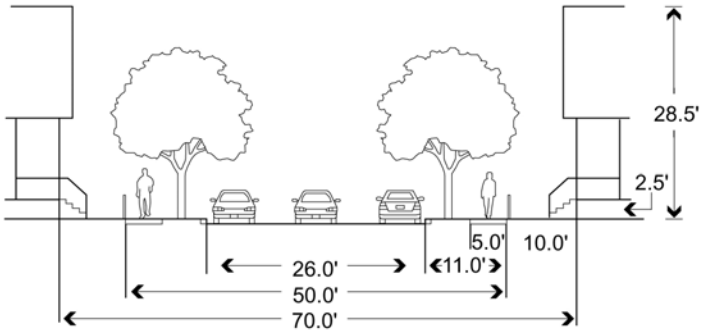
AASHTO Recommended Residential Street

Figure 6(ii):
This variation of the AASHTO Recommended Residential Street, recognizes higher density, larger residential buildings and a reduced building ratio. This can be used in areas with slower traffic and lower parking densities[8].

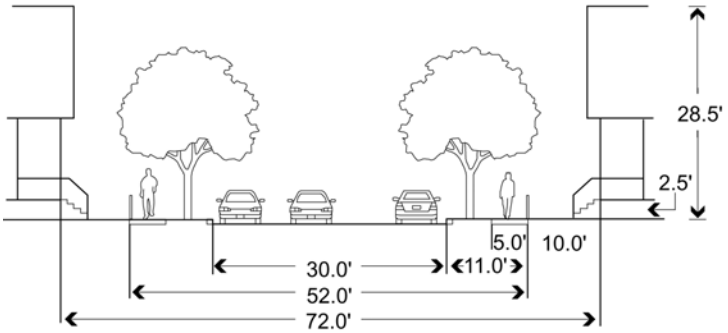


Modified AASHTO Residential Street

Figure 6(jj):
The Yield Street maintains a building ratio of 3:1 while allowing for an opportunity, in lower density environments, to detach the sidewalks. These streets consist of a mix of detached or attached residential and sometimes commercial or live/work buildings. The character, for the most part, remains residential[8].



Yield Street



Non Yield Street

Figure 6(kk):
This illustration is not entirely indicative of a Yield Street but begins to offer some of what is intended in their use. The travel lanes of a Yield Street are narrower than shown. These are predominantly residential streets of multistory buildings, a mix of land use and truck traffic. It calls for a building ratio of 3:1 and allows for both parallel and diagonal parking[8].